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# (54) VIRTUAL MICROPHONE

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(58) Field of Classification Search

# (56) References Cited

#### U.S. PATENT DOCUMENTS

9,704,533	B2 *	7/2017	Warner G11B 27/034
9.912.909	B2*	3/2018	Chen H04N 7/147
10,110,994		10/2018	Davis H04R 1/406
10,306,362		5/2019	Russo H04R 3/005
2008/0091425		4/2008	Kane G10L 17/04
2000/0071425	711	4/2000	704/246
2012/0084087	Al*	4/2012	Yang G10L 17/00
			704/246
2012/0095764	A1*	4/2012	Jeon G10L 15/1822
			704/246
2012/0222575	4 1 1/2	12/2012	
2012/0323575	Al "	12/2012	Gibbon G11B 27/34
			704/246
2015/0237455	A1*	8/2015	Mitra H04N 7/183
			381/92
			001.72
2015/0264505	Al*	9/2015	Tsilfidis H04S 3/00
			381/303
			301/303

(Continued)

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#### (57) ABSTRACT

The disclosed computer-implemented method may include establishing and implementing a virtual microphone. The method may include receiving an input specifying a location for a virtual microphone that is configured to capture audio as if located in the specified location. The method may next include initializing physical microphones to begin capturing audio as if located at the specified location. The physical microphones may be electronically or physically oriented to listen from the specified location. The method may then include combining audio streams from the physical microphones to generate a combined audio signal that sounds as if recorded at the specified location. Various other methods, systems, and computer-readable media are also disclosed.

#### 20 Claims, 9 Drawing Sheets



